

Natural Heritage & Endangered Species Program

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Pine Barrens Bluet Damselfly *Enallagma recurvatum*

State Status: **Threatened**
Federal Status: None

DESCRIPTION OF ADULT: The Pine Barrens Bluet is a small, semi-aquatic insect of the order Odonata, suborder Zygoptera (the damselflies), and family Coenagrionidae (pond damselflies). Like most damselflies, Pine Barrens Bluets have large eyes on the sides of the head, short antennae, and four heavily veined wings that are held folded together over the back. The male's thorax (winged and legged section behind the head) is mostly blue with black stripes on the "shoulders" and top. The Pine Barrens Bluet has a long, slender abdomen, which is composed of ten segments. The abdominal segments are blue with an increasing amount of black distally through segment 7. Segments 8 and 9 are entirely blue, except segment 8 has a small horizontal black dash on each side of the segment. This mark can sometimes be absent. The top of segment 10 is black. Females have thicker abdomens than the males, and are generally brown where the males are blue, though older females may become quite bluish.

Pine Barrens Bluets average just over one inch (26mm to 29mm) in length.

SIMILAR SPECIES: The bluets (genus *Enallagma*) comprise a large group of damselflies, with no less than 20 species in Massachusetts. Identification of the various species can be very difficult and often requires close examination of the terminal appendages on the males (Nikula *et al.* 2003) or the mesostigmal plates (located behind the head) on the females (Westfall and May 1996). The Pine Barrens Bluet is most similar in appearance to the New England Bluet (*E. laterale*), a species of Special Concern in Massachusetts. Both are found at several of their known locations. The two species are most safely distinguished by the shape of the terminal appendages on the male and the mesostigmal plates of the females. The black dash on the sides of segment 8 is generally larger in the New England Bluet, however this feature is highly variable and should not be used for definitive identification.

HABITAT: Pine Barrens Bluets are regional endemics and appear to be restricted to coastal plain ponds. Their range coincides closely with the distribution of those ponds. Some of the common attributes shared by ponds inhabited by the Pine Barrens Bluet include: sandy shallow shores; large amounts of vegetation close to the shore, especially Military



Rush (*Juncus militaris*); and yearly natural fluctuations in water levels. The nymphs are aquatic and live among aquatic vegetation and debris. The adults inhabit nearby uplands and emergent vegetation along the shore.

LIFE-HISTORY/BEHAVIOR: The flight season of the Pine Barrens Bluet is generally restricted to the month of June, with emergence generally occurring during the last week of May. Adults are rarely seen after June. Although little has been published specifically on the life history of the Pine Barrens Bluet, it is likely similar to other, better-studied species in the genus. All odonates have three life stages: egg, aquatic nymph, and flying adult. The nymphs are slender with three leaf-like appendages extending from the end of the body which serve as breathing gills. They have a large, hinged lower jaw which they are able to extend forward with lightning speed. This feature is used to catch prey, the nymph typically lying in wait until potential prey passes within striking range. They feed on a wide variety of aquatic life, including insects and worms. They spend most of their time clinging to submerged vegetation or other objects, moving infrequently. They transport themselves primarily by walking, but are also capable of swimming with a sinuous, snake-like motion.

PINE BARRENS BLUET FLIGHT PERIOD

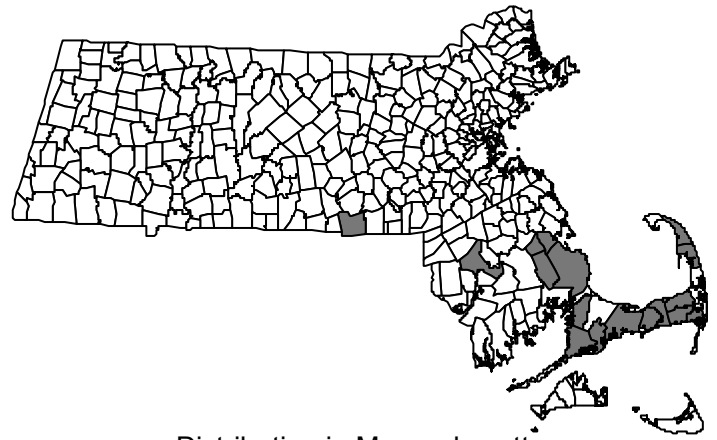
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Please allow the Natural Heritage & Endangered Species Program to continue to conserve the biodiversity of Massachusetts with a contribution for 'endangered wildlife conservation' on your state income tax form as these donations comprise a significant portion of our operating budget.

Pine Barrens Bluets have a one-year life cycle. The eggs are laid during the early summer and probably hatch in the fall. The nymphs develop over the winter and spring, undergoing several molts. In early to mid-summer the nymphs crawl up on emergent vegetation and begin their transformation into adults. This process, known as emergence, typically takes a couple of hours, after which the newly developed adults (teneral) fly weakly off to upland areas where they spend a week or two feeding and maturing. The young adults are very susceptible to predators, particularly birds, ants, and spiders; mortality is high during this stage of the life cycle. The adults feed on a wide variety of smaller insects which they typically catch in flight.

When mature, the males return to the wetlands where they spend most of their time searching for females. When they locate a female, the male attempts to grasp her behind the head with the terminal appendages at the end of his abdomen. If the female is receptive, she allows the male to grasp her, then curls the end of her abdomen up to the base of the male's abdomen where his secondary sexual organs ("hamules") are located. This coupling results in the heart-shaped tandem formation characteristic of all odonates. This coupling lasts for a few minutes to an hour or more. The pair generally remains stationary during this mating but, amazingly, can fly, albeit weakly, while coupled.

Once mating is complete, the female begins laying eggs (ovipositing) in emergent grasses and rushes, using the ovipositor located on the underside of her abdomen to slice into the vegetation where the eggs are deposited. Although the female occasionally oviposits alone, in most cases the male remains attached to the back of the females head. This form of mate-guarding is thought to prevent other males from mating with the female before she completes egg-laying. The adult's activities are almost exclusively limited to feeding and reproduction, and their life is short, probably averaging only three to four weeks for damselflies like the Pine Barrens Bluet.



Distribution in Massachusetts
1977 - 2002

Based on records in Natural Heritage Database

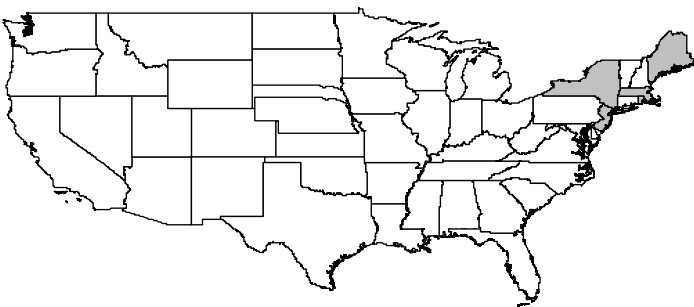
RANGE: The Pine Barrens Bluet has a very small range restricted to scattered locations in the northeastern United States. It has been found only in Maine, Massachusetts, Rhode Island, New York and New Jersey.

POPULATION STATUS IN MASSACHUSETTS: The Pine Barrens Bluet is listed as a Threatened Species in Massachusetts. The species is known mainly from southeastern portions of Massachusetts, primarily Barnstable and Plymouth counties. Unlike the closely related New England Bluet, the Pine Barrens Bluet has occasionally been found in large numbers at some locations, though its overall range is more limited.

MANAGEMENT RECOMMENDATIONS: The major threat to the Pine Barrens Bluet is degradation and destruction of the wetlands which are its breeding and nymphal habitat. Threats include construction and development, artificial drawdown of pond water-level by groundwater pumping, and run-off from roadways and sewage. In addition, high-impact recreational use such as off road vehicles driving through pond shores, which may destroy breeding and nymphal habitat, and motor boats, whose wakes swamp delicate emerging adults, are threats. Since Pine Barrens Bluets, like many species of damselflies, spend a period of several days or more away from the pond maturing, it is important to maintain natural upland habitats adjoining the breeding sites for roosting and hunting. Without protected uplands the delicate newly emerged adults are more susceptible to predation and mortality from inclement weather.

REFERENCES:

- Nikula, B., J. L. Loose, and M. R. Burne. 2003. A Field Guide to the Dragonflies and Damselflies of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program.
- Walker, E. M. 1953. The Odonata of Canada and Alaska, Vol. I. University of Toronto Press.
- Westfall, M. J., Jr., and M. L. May. 1996. Damselflies of North America. Scientific Publishers.



Range of Species in US